Testimony to the Subcommittee on Research and the Subcommittee on Environment, Technology and Standards of the Committee on Science of the U.S. House of Representatives

At a joint hearing regarding
HR 3980, The National Windstorm Impact Reduction Act of 2004

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Chairman Smith, Chairman Ehlers, and Members of the Subcommittees, my name is Jeffrey Sciaudone, and I am the Director of Engineering for the Institute for Business & Home Safety (IBHS), which is a non-profit initiative of the U.S. property and casualty insurance and reinsurance industries with a mission to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters. In short, our mission mirrors the "Findings" section of the proposed House bill on Windstorm Impact Reduction. We are an organization dedicated to natural hazard loss reduction, and very much involved in windstorm impact reduction in our related efforts in research, communications, outreach, building code development and adoption and data collection and analysis.

Windstorm impact reduction helps protect homes and families, keep businesses open and preserve jobs. We know a lot now, but we need to know more. Basic research like that proposed by this legislation is critical to reduce loss of lives and property.

Background on IBHS

Six months ago, I met near the Carolina coast with hurricane researchers from Clemson University and the University of Florida (UF) as Hurricane Isabel bore down on North Carolina. Our purpose of gathering near the landfall of this powerful hurricane was to deploy mobile wind data acquisition towers in front of the land-falling hurricane in order to develop "ground truth" wind speeds in areas immediately adjacent to buildings in harms way. For centuries, hurricanes have assailed our coasts and destroyed homes, businesses and communities. But this past September, as with some previous land-falling hurricanes, these researchers were applying a pioneering technique to help determine a new and more direct correlation to a hurricane's wind speed and the resultant structural damage. Our goal is to document, with more precision than ever before, what works and what doesn't work at the point of impact. Research like this is very similar to the program components as outlined in the National Windstorm Impact Reduction Program Act of 2004, which calls for research to improve knowledge and data collection on the

impact of severe winds on structures, as well as collecting and inventorying information on structural performance in windstorms. What this bill aspires to do in the future is essentially what our partners in hurricane research have been doing in the recent past. Activities like this form the basis for the development of mitigation action plans at IBHS.

In fact, the majority of IBHS activities relating to windstorm impact reduction involve applying research and development that has been conducted by universities, federal agencies and construction industry related trade associations. The goal of these activities is to understand, communicate and implement the latest knowledge on windstorm mitigation into the work of the organization. These activities include:

- Maintaining a series of consumer focused guides and brochures that relate to a wide range of natural disasters, including windstorms.
- Maintaining a website with information on natural disaster mitigation, including windstorm damage mitigation. You can learn more by visiting www.ibhs.org.
- Developing two interactive web-based programs to help home and business owners develop customized pre-disaster mitigation plans and post-disaster recovery plans, as well as identify home structural improvements.
- Implementing the "Fortified…for safer living" program to encourage natural disaster resistant new residential construction throughout the country.
- Serve as a technical resource for our member insurance companies to help them better understand technical aspects of windstorm mitigation.
- Support building codes that address natural disaster damage mitigation.
- Support the adoption of the latest model building codes as written on the state level.
- Participate in the development of the ASCE 7 wind provisions that are the basis for wind loads in the current model building codes.
- Establish statewide coalitions for natural hazard loss reduction that incorporate land use planning emphasis in mitigation activities among multiple state and local government agencies, as well as private concerns.

Over the past few years, IBHS has worked closely with several universities including Clemson University, the University of Florida, Florida International University and Oregon State University, to stay abreast of current research and information. Similarly, IBHS works with FEMA on flood and wind related retrofit issues as well as the Department of Energy through Oak Ridge National Labs as a part of the Roofing Industry Committee on Weather Issues (RICOWI). IBHS also has working relationships with several construction and testing related trade associations, including APA-the Engineered Wood Association, and the National Roofing Contractors Association. In addition, we also work regularly with code and standard development organizations like the International Code Council (ICC), the National Fire Protection Association (NFPA) and Underwriters Laboratories (UL).

In addition to the applied research related activities above, IBHS does occasionally get involved in performing and funding basic research. One such case involved IBHS providing match funding to Clemson University to conduct full scale, destructive testing

of houses in Horry County, SC. This project involved testing actual homes before and after hurricane retrofits were applied to determine how much strength was being added to the structure using various retrofit techniques. The houses were made available because they were bought out by FEMA following their extreme flooding during Hurricane Floyd. Primary funding was provided by the South Carolina Department of Insurance.

The results of this research were used to help validate and refine the mitigation messages that we use at IBHS. For example, the conclusions from this research included:

- Straps used to retrofit roof-to-wall connections in older homes need to extend up, and preferably over, the rafter to prevent splitting under extreme wind pressures.
- Simple retrofits like gluing the roof sheathing to the rafters can increase the wind resistance of the roof deck by up to a factor of three.
- Lightweight, fabric based shutters installed from inside a home can be effective to stop wind borne debris and prevent internal pressurization of buildings and widespread water damage.

Perhaps more importantly, this research verified the fact that our recommendations will, in fact, make a difference in how individual homes will perform in the face of extreme windstorms. It is important that we continue to measure the effects of such mitigation actions and that research continues to find creative new ways to build new and retrofit existing structures to survive hurricanes and other windstorms.

IBHS also works with other partners from time to time to fund research studies that estimate the savings provided through the implementation of new and stronger building codes in coastal environments. Three such reports have been prepared over the past two years by Applied Research Associates in Raleigh, NC, for analysis of the impacts of new codes along the North Carolina, South Carolina and Texas coastlines. The reports prepared for the Carolinas show that there is a positive net present value for adding window protection to homes along the North and South Carolina coast when the cost of the protection today and the expected loss saving in hurricanes over the life of the mortgage on the home (30 years) are considered.

The Texas study took a slightly different approach and concluded that recommended changes to the Texas Windstorm Insurance Association Building Code for coastal Texas will reduce expected losses from a design level hurricane (130 mph) occurring in 2013 by $155 million. Likewise, these improvements would result in a savings of $377 million for the same storm occurring in 2023.

Studies like these would not have been possible 15 years ago. They are only possible today because of a combination of advanced wind engineering research and improved computer technology. This critical advanced wind engineering research was only possible through programs funded by federal and state governments. Continued and increased funding will provide even broader opportunities for the application of the research to reduce the windstorm impact.

Beyond research activities, IBHS works with organizations on the federal, state and local levels in a couple of different ways to support windstorm impact reduction. The first is through the distribution of our materials through third parties. Oftentimes, this is accomplished through providing materials to local grassroots organizations to help get the word out locally. Notable partners include South Carolina Sea Grant and North Carolina Sea Grant and several state departments of Emergency Management. The second way is participating in the building code adoption process on the state level. Over the past few years, IBHS has taken an active role in wind prone states, including North Carolina, South Carolina, Texas, Florida and New York.

Windstorm Data Collection and Analysis Activities

Typically, insurers use catastrophe modeling companies like Applied Insurance Research (AIR), Risk Management Solutions (RMS) and Applied Research Associates (ARA) to analyze their overall exposure to severe windstorms like hurricanes, tornadoes and even hail storms. These analyses are generally based on the underwriting data they collect and assumptions made by the modeling companies based on their research into construction practices on a regional level. The loss estimates produced by these catastrophe models are used by insurers to help them set reserves, determine the need for reinsurance and provide input for setting appropriate premiums. As discussed in the previous section, these models incorporate the latest wind engineering research and information and computer technology.

The main reason that insurers use these models to estimate their risk is because they can not adequately assess their risks using historical data alone since there have not been enough extreme wind events to produce enough data to perform traditional actuarial analyses.

When it comes to producing meaningful data to assess the effect of windstorm mitigation activities, several things need to be determined. First, the actual wind speed that the building was exposed to needs to be known. Then, details as to what parts of the building fail as a direct result of wind pressures need to be documented. By comparing the wind speed with the pieces that are failing, researchers can begin to make credible quantifications of the effects of windstorm mitigation. This connection forms the basis for many of the available catastrophe models.

The data that insurers collect as a part of the claims process following major wind events, on the other hand, relate mainly to documenting the damage for which the policyholder needs compensation and making sure the insured is made whole in a timely manner. The role of the insurance adjuster in such a scenario is to document, estimate and pay (or arrange for payment to) the insured. This is why IBHS is interested in the topic of engineering data collection following extreme wind events. The data developed and collected from an engineering standpoint is absolutely critical to measure the effectiveness of mitigation efforts and to identify new areas for research.

This brings us back to IBHS' work with hurricane researchers from Clemson University and the University of Florida (UF). As mentioned earlier, teams from Clemson and UF have for several years now deployed mobile wind data acquisition towers in front of land-falling hurricanes to match the data of "ground truth" wind speeds with building damage. Hurricane Isabel in 2003 was the first time that these mobile towers were equipped with cellular modems that allowed for uploading of wind speed data in real time to the Internet. This information ensured that the systems were working throughout the storm as well as serving as input for NOAA's track prediction models.

The development of the wind speed data was accomplished mainly through the Florida Coastal Monitoring Program (FCMP). Additional information on the Hurricane Isabel deployment and other components of the program – including pressure instrumentation of individual homes – is available on the FCMP website located at www.ce.ufl.edu/~fcmp.

Also as a part of the Isabel data collection effort, IBHS staff developed a handheld, palm-pilot based damage data collection system in conjunction with Clemson and UF so that damage data could be collected quickly and efficiently following the event. The plan for damage data collection was to survey direct wind damage in the vicinity of the mobile towers where wind speeds were known. Fortunately for the residents of eastern North Carolina, very little direct wind damage was observed near the tower locations and in areas that were accessible to the teams.

While no significant direct wind damage data was collected from this event, IBHS and the university researchers are ready to develop this data from future storms. However, in order to continue and expand these programs, additional future funding will be required. The majority of the infrastructure developed by Clemson and UF on this project was funded through the Florida Department of Community Affairs. Sea Grant provided most of the funding for deployment of the university research teams in the Carolinas. In order to continue these efforts, new sources of funding for infrastructure investment, including new mobile wind towers and vehicles to deploy them, need to be established.

In March of 2004, IBHS participated in a forum organized by Texas Tech University (TTU) to standardize the data collected by wind researchers following all extreme wind events. The intent of this effort is to develop wind damage databases that are built on a common understanding of damage classification so that data collected from a variety of researchers can be combined and used together to create a more robust data set. IBHS is currently working with TTU to adapt the handheld, palm-pilot based forms for use in collecting tornado damage data later this year.

Availability of Insurance Data

Insurance data on losses from windstorms are currently available in a couple different places. First, the Property Claims Service (PCS), which is a part of the Insurance Services Organization (ISO), publishes insurance industry catastrophic property loss estimates following a wide range of natural and man-made disasters. Additionally, insurers are required to report loss data on a yearly basis to the respective state

departments of insurance as a part of the regulation of the industry. The federal government may be able to get at some of the desired data through these channels.

However, based on the content of the draft legislation, it appears that the most desired data would be that which could quantify the reduction of windstorm impact over time and to determine target areas for future research. The insurance data discussed above will probably not serve this purpose well because it does not account for the specific actions that would ultimately be undertaken for individual buildings exposed to windstorms. The details important for quantifying the effects of mitigation actions are the details being gathered by wind researchers from institutions like Clemson, UF and TTU. In fact, IBHS is involved with these groups so that we can provide this useful data back to our members in the insurance industry and appropriately focus our ongoing activities.

Obstacles to Implementation

The main obstacles to widespread implementation of windstorm mitigation techniques in new and existing structures relate directly to issues of complacency and cost. Our experience in implementing our "Fortified…for safer living" program tells us that homeowners are, in general, complacent about their exposure to extreme windstorms. For example, people who live in central Florida might say that the real risk is in South Florida, or the Panhandle. Likewise people who live in the Florida Panhandle may say the real risk in the Keys or in the Carolinas. The problem is that no one thinks they are the most exposed and they assume that the chances of a major windstorm are slight and not worth worrying about.

Because of the low perceived risk from windstorms, consumers are less likely to spend the money to make their homes more resistant to windstorms – especially when they can spend their money on upgrades they can enjoy everyday like granite counter tops and hardwood floors. The competition to spend extra money rarely ends with the mitigation actions winning out.

Concluding Remarks

Buildings that survive windstorms unscathed are a benefit to the communities in which they stand. People stay in their homes, businesses remain open and people continue to go about their lives with minimal disruption. Disaster resistant communities are also likely to not be victims, and will require little, if any, government assistance to recover from a disaster.

Windstorms and other natural disasters happen every year in the United States, and affect thousands of homeowners and businesses. Much is currently known about how to mitigate these losses and, fortunately, we are learning more every day. While there will always be an element of chance in where and how badly a windstorm strikes, we in this country increasingly have the choice to be better prepared against these events. I look forward to learning more from the continuation of the programs I discussed here today along with the creation of new research efforts that will help IBHS fulfill our mission to reduce the impact of natural disasters like windstorms.

Research into all aspects of windstorm effects, from public attitudes to meteorology and wind engineering, produced as a result of the National Windstorm Impact Reduction Act of 2004 will help form a foundation for protecting our citizens, property and economy from windstorms. The millions of dollars spent over the next few years could save billions of dollars in windstorm losses in the future.

Thank you for the opportunity to testify before the subcommittees today.

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Education and Registration

Bachelor of Science	Civil Engineering 1994	Clemson University
Master of Science	Civil/Structural Engineering 1996	Clemson University

Thesis topic: Analysis of Wind Borne Debris Impact Loads

Professional Engineer, Civil/Structural, Massachusetts # 41577

Summary of Experience

Experience

Institute for Business & Home Safety	March 1999 – present
Director, Engineering	2002 – present
Associate Director, Engineering	2000 – 2002
Project Engineer	1999 – 2000
Impact Forecasting, L.L.C., Engineer/Project Leader	August 1996 – February 1999
Clemson University Wind Load Test Facility, Research Asst.	January 1995 – August 1996

Research and Development

- Responsible for development and implementation of an inspection based, code-plus, residential construction program.
- Inspected damage following hurricanes, tornadoes and earthquakes.
- Developed computer models to predict wind damage to low-rise structures.
- Developed and implemented procedures for using proprietary risk analysis software.
- Established data conversion procedures for portfolio analyses.
- Designed and constructed apparatus to measure impact response and wrote software for data collection.

Leadership

- Provided technical continuity for all Engineering functions of IBHS throughout corporate relocation to Tampa, FL from Boston, MA.
- Provided technical direction and support to strategic, operating and marketing plans.
- Developed proposals for new projects and programs to sharpen corporate focus.
- Participated in planning and execution of company-wide reorganization.

Communications

- Developed technical discussion documents for communicating natural disaster mitigation information.
- Provided technical expertise for print and video news releases, articles and specials on various natural disaster mitigation topics.
- Regularly presented projects and initiatives to various technical conferences, clients, member companies, partner organizations and corporate Board of Directors.
- Represented organization in print, audio and television media.
- Continually presented technical disaster mitigation information to a non-technical audience.
- Utilized GIS software to display risk analysis results.
- Authored occasional subject articles for construction and insurance related periodicals.

Building Codes and Standards Development

- Represented IBHS on several code development committees including ASCE 7 Main and Wind Load Committees, NFPA 5000 Structural Committee and SBCCI Hurricane Resistant Residential Construction Committee.
- Participated in numerous materials and construction standards committees for the ASTM and ANSI processes for roofing materials, edge flashing, doors, windows and shutters.
- Represented IBHS to Building Code Councils in North Carolina, South Carolina, Florida and Missouri.
- Provided staff support for committees of insurance professionals on issues regarding roofing performance, natural disaster related research and catastrophe data reporting.

Committee Service and Professional Affiliations

- Member of the Building Seismic Safety Council (BSSC) Board of Direction (2000—present).
- Secretary of the Roofing Industry Committee on Weather Issues (RICOWI) Board of Directors (1999 – present).
- Liaison to the Applied Technology Council (ATC) Board of Directors (2001 – present).
- American Society of Civil Engineers (ASCE), Member (1992—present).